

I. EXECUTIVE SUMMARY

The cost of natural gas to California consumers is composed of two primary components - the commodity cost of natural gas and the cost of delivery over interstate and intrastate pipelines. The increase in natural gas costs experienced by California consumers over the last few years has been driven by the increase in the commodity price of the gas itself. Many consumers also pay for natural gas storage.

Commodity prices of natural gas are determined by forces of demand and supply in an unregulated market, and established by direct transactions between buyers and sellers. No government agency determines what prices should be paid in the market for the gas commodity component. Natural gas utilities in California typically file requests at the California Public Utilities Commission (CPUC) to seek recovery of the costs incurred for buying the gas commodity for their customers, pursuant to “gas cost incentive mechanisms” adopted by the CPUC. The CPUC reviews the utilities’ requests, but has no authority to limit or regulate the price that suppliers can charge the utilities. However, the rates for delivery of gas over interstate and intrastate pipelines are regulated. The Federal Energy Regulatory Commission (FERC) regulates rates for delivery over interstate lines while the CPUC regulates rates for delivery over intrastate transmission lines.

The primary driver of the recent volatility and increases in natural gas prices to consumers is the gas commodity market. The state agencies (the CPUC and the California Energy Commission) believe that underlying, “fundamental” market conditions explain why U.S. natural gas commodity prices have been increasing on a long-term basis since early 2002, such as:

- The flat level of natural gas production in the U.S. and Canada despite very high levels of drilling
- A significant increase in the demand for natural gas for electric generation
- Significantly increased costs of drilling since the mid-1990s

- Record-high oil prices
- Increased competition in the global natural gas market, causing price increases in LNG supplies to the U.S.

Hurricanes Katrina and Rita, following directly after an abnormally warm summer (which caused prices to escalate due to heavy electric generation demand), severely exacerbated the already tight supply-demand balance by temporarily knocking out of production about 10 billion cubic feet per day of production, roughly 20 percent of the natural gas production in the entire U.S. This caused the price of natural gas to dramatically increase in the weeks after the hurricanes. Due to good levels of natural gas storage, warm weather, and the restoration of most Gulf production, the price of natural gas has fallen back to levels prior to the hurricanes, even though some Gulf production remains off-line. Natural gas prices remain at high levels relative to the 1990s, and are expected to be high for the next few years.

Natural gas prices have been increasing over the last few years all around the U.S., not just in California. The recent run-up in national natural gas prices is mainly occurring in the North American supply basins. The price increases are not specific to California as was the case during the 2000-2001 price spikes. In fact, California is actually enjoying lower natural gas prices than the U.S. average.

This report presents data that shows that there are a fairly small number of dominant firms, relative to the total number of companies, in certain sectors of the natural gas industry, including sectors that produce, transport, or market natural gas supplies in the U.S. Most if not all of these firms are actively involved in supplying natural gas to California. Many of these firms are also involved to various degrees in other sectors of the natural gas industry, in the petroleum industry, and in electric generation.

The state agencies do not have jurisdiction to investigate and determine whether at this time any of the gas suppliers are exercising market power in the natural gas industry in order to manipulate U.S. or regional natural gas prices. Our findings do not rule out the possibility that market manipulation is occurring. The high degree of volatility in natural gas prices can lend itself to the possibility of manipulation. The state agencies have not conducted a detailed examination of daily price movements. We have no evidence of any actual price manipulation.

The governmental agencies, which have jurisdiction to conduct an investigation of price manipulation in the regional or national market are the FERC, the Commodity Futures Trading Commission (CFTC), the U.S. Department of Justice (U.S. DOJ), and/or the Federal Trade Commission (FTC).

Findings of the state agencies are organized by the questions posed on October 17, 2005. Details on these findings are included in the three Appendices to this Report.

II. RESPONSES TO QUESTIONS

A. Responses to Questions Concerning Prices

A.1. How can we at the state level reassure ourselves and our constituents that the extraordinary prices we are experiencing today are free of such manipulation?

We should first analyze natural gas market conditions to determine whether there appear to be sound, rational reasons for an increase in gas prices. As part of this step, we should try to determine whether, at an overall level, market prices are responding to market conditions in a manner that would appear logical.

To provide further assurances, a detailed analysis of actual transactions in the natural gas market between parties that may be suspected of manipulation would need to be conducted.

The state agencies have reviewed market conditions over the last few years. As explained in the appendices, we believe that fundamental market conditions provide a good explanation for why natural gas prices have been increasing over the last few years. Given time constraints for this report, we have not examined daily movements of natural gas prices, but we believe the overall direction of prices can be generally explained by market conditions.

To conduct a detailed examination of actual transactions in the natural gas market, one would obviously need to have broad access to detailed transaction records and other information possessed by market participants. The only transaction records that the state agencies have direct access to are transactions that involve regulated natural gas and electric utilities and possibly other California state agencies, such as the Department of Water Resources (DWR) or the Department of General Services. The FERC, CFTC, U.S. DOJ, and/or the FTC are the agencies that have the authority to conduct any investigation of price manipulation in regional or national natural gas markets.

A.2. How can we reassure ourselves and our constituents that the indexes driving the extremely high retail rates are free of such manipulation, and in fact represent robust, realistic market prices?

Before directly responding to this question, the state agencies wish to correct a possible misconception about the relation between price indices and retail gas rates. As noted above, natural gas is bought and sold in a national market in the U.S. and the market prices for natural gas transactions are generally established directly between market participants. If reported to major gas industry publications that develop price indices, such transaction prices are used in calculating the price index. Natural gas prices for some supply transactions are commonly linked to the price indices reported by major industry publications. So, retail natural gas prices are partly, and probably mainly, determined by direct transactions between market participants, and to a certain extent are also driven by index-related transactions.

Regulated natural gas utilities in California purchase their natural gas supplies, mainly for residential and small commercial customers, in direct transactions with natural gas producers or marketers. The prices of the bulk of those transactions are not determined by the price indices. California natural gas utilities procure about 90-95 percent of their natural gas supply under monthly, fixed price contracts.

The gas price indices published by gas industry journals are used to establish cost benchmarks for the “gas cost incentive mechanisms” adopted by the CPUC for the major California natural gas utilities. These mechanisms provide an incentive for utilities to procure natural gas at prices below the price indices. Generally, if the annual actual procurement cost of natural gas incurred by a utility is lower than the benchmark cost, calculated using price indices, the utility

receives a reward. If the annual actual procurement cost of natural gas incurred by a utility is higher than the benchmark cost, the utility incurs a penalty.

In order to reassure ourselves and our constituents that natural gas price indices are robust and free of manipulation, beyond undertaking the measures noted in the response to question A.1 above, one should:

- Examine whether the volume and number of deals that the gas industry publications report are relatively high for the price indices pertinent to California,
- Examine the reporting procedures of major gas industry publications, and
- Confirm whether transactions reported by firms to gas industry publications actually constituted legitimate purchases or sales.

The CPUC regularly monitors the monthly price indices, and the number and volume of deals associated with indices pertinent to California. The indices that are important to California are typically based on a relatively high number of deals and volumes compared to most other indices. Additionally, the volumes for the two most important “benchmark” indices for California, the SoCal border and the PG&E city gate indices, are typically a significant fraction of the total volume being delivered to California.

As discussed more fully in response to question A.6, the FERC recently conducted an investigation of price indices reported by major gas industry publications, and the procedures used by those publications. Following that investigation, the gas industry publications have made some positive changes in their data collection and price reporting.

However, the state agencies do not have jurisdiction to examine actual transactions being conducted in the natural gas market (except those involving regulated natural gas and electric utilities and possibly other California state

agencies), and are likely unable to compel gas industry publications to reveal their data to us.

A.3. How much gas is actually being bought and sold at the reported prices?

The state agencies do not know the total amount of natural gas bought and sold at the “reported prices.” We do know, or have access to, the prices paid by regulated California utilities.

Natural gas is bought and sold in a national market in the U.S. Transactions may take place for example, directly between a consumer and a producer, between a marketer and a producer, or between a consumer and a marketer. Natural gas supply deals may be priced at a fixed price for a day, for a month, or for a longer period of time. Natural gas prices for supplies are also commonly linked to the price indices reported by major industry publications. For example, a one-year supply deal may specify that the price of the natural gas for each month is at the monthly Gas Daily price index for a specific receipt point.

The “reported prices,” i.e., the price indexes reported by major natural gas industry publications, only are for daily or monthly transactions. No major gas industry publication develops any reported indices for transactions with terms longer than a month. There is no law or regulation that requires market participants to report their deals to gas industry publications, so the price indices are based only on the prices voluntarily provided by market participants. The state agencies are not aware of any source of data that indicates the total amount of natural gas bought and sold at index prices, or under long-term deals.

The major gas industry publications that establish the price indices do report the number of deals, the volume, and the range of prices that they base their price indices upon.

So, the state agencies do not know how much natural gas is bought and sold in the market at the various price indices, but we do know the number of deals, the volume, and the range of prices that the daily and monthly price indices are based upon.

A.4. Who establishes the prices?

A.5. What are the mechanics of price disclosure and discovery?

The price of the natural gas commodity is unregulated. The market establishes natural gas prices, at the time a trade of the physical commodity or a futures contract is executed. Buyers and sellers trade natural gas through private transactions, through over-the-counter transactions, and through trading forums or exchanges. The price for each transaction is established at the culmination of each trade and is the amount a willing buyer pays a willing seller for the commodity or futures contract.

Details of natural gas physical trades may be reported to the trade press by the executing parties. Details of natural gas futures contracts must be reported to the New York Mercantile Exchange (NYMEX). These entities collect data on the trades, compile it, and publish the results in indices that are central to the functioning of both the wholesale and futures market.

There are two types of natural gas price indices; those created and published by the trade press to disseminate cash price information to the industry, and one developed and published by the NYMEX to disseminate futures price information. These indices are central to the functioning of both the wholesale and futures market. Natural gas customers and traders rely on these published price indices to make physical purchases and to buy and sell futures contracts and options. Market participants rely on these price indices to help them make informed decisions about trading and to evaluate new investments.

When the organizations publishing the indices receive the raw data on each transaction, it is sorted into pricing locations, given a reasonableness check and examined for irregular data before being compiled. A detailed explanation of the method each index compiler uses to process the data and calculate the index is included in Appendix I.G.

A.6. How robust are the indices and other price reporting mechanisms?

Following the California energy crisis in 2000-2001, the FERC found significant problems with published wholesale price indices. Several market participants were found to have purposefully misreported prices in order to manipulate these indices for financial gain.

The problems identified by the subsequent FERC report¹ include:

- (1) an inability to independently verify published price indices,
- (2) undetected errors which may exist because statistically valid sampling procedures or verification procedures were not employed,
- (3) incentives of market participants to manipulate spot market prices reported to trade publications because the electric generators in California utilize gas for generation,
- (4) wash trades may have an adverse effect on reported price data, and
- (5) the potentiality of Enron On-Line, Enron's former electronic trading platform, to be susceptible to manipulation of market participants which could affect the published price indices.

The FERC report concluded that the natural gas industry must take the lead in solving the problem of inaccurate information reported in gas price indices. Industry groups, the gas press, the FERC and the CFTC worked together to understand the functioning of the natural gas market, to improve the price survey process and to increase the number of participants. The federal government has

¹ FERC staff initial report in Docket No. PA2-2-000.

undertaken a series of regulatory and statutory efforts to improve the accuracy of the natural gas price indices. It issued standards on voluntary price reporting and results of conduct in a July 2003 policy statement. New reporting rules and verification procedures have been established by the indices reporting entities to prevent manipulation or inaccurate reporting.

Steps were then taken to improve FERC's ability to monitor price indices and enforce market rules through reviewing wholesale prices for anomalies that could indicate market problems and collaboration with other entities such as the CFTC.

The Energy Policy Act enacted in August 2005 increases the amount for criminal and civil penalties that the FERC may impose on companies that participate in anticompetitive behavior, including knowingly misreporting price information to index developers. It gives the FERC authority to collect additional transaction information if such information is necessary to ensure price transparency. Furthermore, the FERC and the CFTC entered into a memorandum of understanding to share and coordinate requests for information, which will allow FERC to more readily identify and sanction market manipulation.

According to the United States Government Accountability Office (GAO),² many industry stakeholders report that they now have greater confidence in most price indices. FERC reports that stakeholders are generally satisfied with current price indices and that the quality of information has improved. In a recent FERC survey, two-thirds of respondents reported their confidence in price indices, on a scale of 1 to 10 (with 10 being most confident), as a 7 or greater. The GAO report indicates that since 2002 the quality of information has improved because more companies are reporting data to publishers and the major publishers are providing more information about the number of transactions and volume of natural gas trades.

² United States Government Accountability Office GAO-06-275, December 2005.

The extent of these reforms has been significant and it appears that the indices reporting natural gas wholesale and futures prices are functioning at a more precise level than previously.

B. Responses to Questions Concerning Market Concentration

B.1. What is the extent of vertical integration in the producing and processing functions?

B.2. What is the extent of vertical integration among producers, processors, and pipelines?

B.3. What are the relationships between marketers and brokers, on the one hand, and owners of the physical elements of the gas system (production, processing, transmission)?

B.4. What is the relationship between marketers and brokers and financing entities such as investment banks?

Since these four questions are interrelated, and all are intended to gain an understanding of the degree of vertical integration in California's natural gas market, the state agencies have responded to these questions with a single comprehensive response, rather than respond to each of these questions individually.

California's natural gas industry includes both integrated companies and companies focused on particular segments of the natural gas business. We have identified specific companies that have a significant presence in one or more part of California's gas market. For each of these companies, we have used publicly available data to identify each company's role in several key market segments. We used this data to identify the degree of vertical integration. Overall we have found that the largest companies operating in California's natural gas market vary in terms of their degree of vertical integration. Some are specialized in one or two market segments such as natural gas production, pipeline ownership, or power

ownership. Others are involved in several different business segments. Below we identify specific companies and their cross-ownership in multiple market segments. The detailed data on individual companies is contained in a series of tables in Appendix III. The list of companies is by no means exhaustive, but includes significant market participants.

Eight natural gas market segments were reviewed:

- Natural gas production in California supply basins
- Gas processing in California supply basins
- Ownership of interstate pipelines directly serving California
- Holdings of pipeline capacity on interstate pipelines serving California
- California natural gas storage
- Natural gas marketing
- Retail gas supply to core and non-core customers
- Electric generation in California and the West

We also identified other business interests that could have an impact on the natural gas market in California.

Gas Processing Is Controlled by Producers and Independent Processing Companies

Some processing plants are owned by producers, while others are owned by independent gas processing companies. Processing plants owned by producers typically process third party gas, in addition to gas owned by the plant owners.

Below we note which companies are producers, processors or both.

Appendix I indicates each company's ownership of natural gas processing facilities in California's natural gas supply basins.

Natural Gas Producers with Significant Processing Assets: BP plc, Chevron Corp., ConocoPhillips, Devon, Occidental Petroleum, Questar Corp., Williams Companies Inc.

Natural Gas Producers with Limited or No Processing Assets: Anadarko

Petroleum Corp., Black Hills Corporation, El Paso Corp., Encana Corp.,
ExxonMobil Corp., Royal Dutch Shell plc

Natural Gas Processors with No Production: Duke Energy

Only One Interstate Pipeline Owner Owns Production or Processing

El Paso is the only major pipeline company that is also in the natural gas production business. No major pipeline owner is significantly involved in natural gas processing.

Most Pipeline Capacity Holders Are Producers, Marketers, or Consumers of Gas

The business of shipping gas on interstate natural gas pipelines is generally integrated with gas production, marketing or consumption. Dozens of companies, municipalities and the DWR hold the rights to transport natural gas on the interstate pipelines serving California through short-term and long-term contracts. The major pipeline capacity owners in California are utilities, producers, consumers, and marketers of natural gas. Investor- and municipally-owned utilities use their pipeline capacity to transport gas they purchase at the supply basins for use in their service territories. Producers, including integrated oil and gas companies and independent exploration and production companies, transport their own production and the production of others. This gas can then be marketed directly to consumers. Integrated oil and gas companies may also use some gas internally in their California refineries. Consumers, such as wholesale electric generators, hold pipeline capacity to transport gas purchased at the supply basins to their California gas-fired power plants. Marketers hold pipeline capacity that can be used to transport gas from supply basins to California where it can be marketed to consumers.

Most California Gas Storage Is Integrated with Utility Operations, but Two Facilities Are Controlled by Independent Owners

Seven of California's nine natural gas storage facilities are owned by the two largest natural gas utilities—SoCalGas and PG&E. One facility, Lodi, is owned by

a private energy investment firm—ArcLight Capital Partners. The other facility, Wild Goose, is owned by an independent exploration and production company—Encana Energy. CPUC decisions have prohibited the two independent storage owners from doing business with affiliates, so their ability to integrate their storage operations with any other natural gas activities is limited.³

Most Natural Gas Marketers Are Involved in Other Gas Market Segments

Natural gas is marketed in California by natural gas producers marketing their proprietary gas and companies marketing others' production. Many of the companies marketing others' production are themselves natural gas producers or power generators that consume natural gas. Of the top 20 North American gas marketers identified by Gas Daily in their most recent survey, all but two companies own substantial natural gas production or power generation assets. The two exceptions are financial services firms, UBS and Merrill Lynch.

Some Wholesale Marketers Are Also Retail Gas Suppliers in California

Many, but not all, retail gas suppliers in California are also wholesale marketers. However, some wholesale marketers are not retail gas suppliers. Of the 18 companies we identified as significant wholesale marketers in California, 12 have also been identified by the investor-owned utilities as suppliers of gas to non-core customers. The other six are not retail gas suppliers:

Wholesale Marketers Involved in Retail Marketing: Black Hills Corporation, BP plc, Calpine Corp., Chevron Corp., ConocoPhillips, Constellation Energy Group Inc., Duke Energy, Occidental Petroleum Corp., Reliant Energy Inc., Royal Dutch Shell plc, Sempra Energy, Williams Companies Inc.

³ D.02-07-036 concerning Wild Goose Storage; D.03-02-071 and D.05-12-007 concerning Lodi Gas Storage.

Wholesale Marketers Not Involved in Retail Marketing: Anadarko Petroleum Corp., Devon Energy Corp., El Paso Corp., Encana Corp., ExxonMobil Corp., Questar Corp.

Some Western Electric Generators Operate in Other Natural Gas Businesses

Nineteen of the 26 companies in our survey have financial interests in electric generation in California or the western region. Some generators have large gas marketing business, including Black Hills, Calpine, ConocoPhillips, Constellation Energy, Sempra Energy, and Williams. Edison International and Reliant Energy have limited involvement in the natural gas business outside of their generation activities. PG&E is a large natural gas utility, in addition to owning generation. The generation ownership of the major oil companies including BP, Chevron, ExxonMobil, and Royal Dutch Shell primarily consists of cogeneration associated with refineries or other facilities.

Financial Firms Have Limited Direct Involvement in the Natural Gas Market in California

Some financial services firms, such as UBS and Merrill Lynch, have gas marketing businesses that are active in California. However, these firms are not the largest marketers. The owner of the independent Lodi gas storage facility, ArcLight Capital Partners, is a private equity firm. Otherwise, the primary businesses active in California's natural gas market are principally operating companies, not financial firms.

Sempra Energy's Investments Include Development of an LNG Import Terminal

Sempra Energy is developing an LNG regasification facility in Baja California. Commercial operations are expected to commence in early 2008. Half of the initial import capacity will be utilized by Shell under a 20-year contract. Sempra signed a 20- year purchase-and-sale contract with BP for the other half of the terminal's capacity. Sempra will be marketing those volumes.

B.5. How concentrated are each of the markets for physical production and delivery services?

B.6. How concentrated are each of the markets for financing, marketing and trading natural gas for delivery and use in California?

The state agencies have also responded to the questions related to market concentration with a single overall response. In general, when available we have identified the largest companies operating in each natural gas market segment in California, the United States (U.S.), or North America. When available we have indicated the percentage of the total market controlled by each company.

Top 20 Producers Account for 46 Percent of Natural Gas Production

There are over 8,000 natural gas producers in the U.S., ranging from large integrated oil companies to small private owners.⁴ In addition, there are numerous gas producers in Canada, another important part of North America's natural gas system.

The table below lists the top natural gas producers in the U.S. based on 2004 natural gas production. The table indicates the amount of gas each company produced in the U.S. in 2004, each company's U.S. gas reserves on December 31, 2004, the number of wells drilled in 2004 and each company's total assets at year end 2004. The summary statistics at the bottom indicate how much of total U.S. natural gas production and reserves were attributable to the top 10 and top 20 U.S.-based producers. About one-third of U.S. production was controlled by the top 10 producers, while 46 percent was controlled by the top 20. The top 10 reserve holders owned nearly 40 percent of total U.S. gas reserves, and the top 20 owned over 50 percent of total U.S. reserves.

⁴ Natural Gas Supply Association, "Industry and Market Structure." www.naturalgas.org/business/industry.asp, cited November 22, 2005.

TABLE B. 5-1: Top U.S. Natural Gas Producers, 2004

Company	US Gas Production		US Reserves (12/31/04)		US Net Wells Drilled		Total Assets (12/31/04) ¹	
	Rank	Bcf	Rank	Bcf	Rank	Wells	Rank	\$ MM
BP	1	1,003	1	14,100	11	522	2	193,200
ConocoPhillips	2	950	2	12,654	3	837	4	108,605
Chevron	3	880	5	5,081	1	1,044	5	108,309
ExxonMobil	4	846	3	12,329	7	598	1	195,256
Devon Energy	5	602	6	4,936	5	749	8	29,736
Anadarko Petroleum	6	499	4	6,093	8	558	11	20,192
Royal Dutch Shell	7	486	14	2,800	12	506	3	192,800
Dominion E&P	8	327	7	4,904	2	952	14	11,300
Chesapeake Energy	9	322	10	4,374	9	546	15	8,245
Encana	10	317	9	4,600	10	534	7	31,200
Kerr-McGee	11	306	11	3,772	13	443	13	14,518
XTO Energy	12	306	8	4,715	16	410	17	6,110
El Paso	13	238	19	1,724	20	324	6	31,383
EOG Resources	14	237	16	2,383	4	819	18	5,799
Apache	15	237	15	2,406	21	234	12	15,502
Marathon Oil	16	231	22	1,364	29	195	9	23,423
Pioneer Natural Resources	17	201	12	3,000	22	254	16	6,647
Noble Energy	18	198	20	1,711	14	434	20	4,872
Newfield Exploration	19	198	24	1,240	26	205	21	4,328
Williams Companies	20	191	13	2,986	6	710	19	5,576
Occidental Petroleum	21	186	18	2,101	18	398	10	21,391
Equitable Supply	27	72	17	2,103	23	247	33	1,514
Western Gas Resources	33	55	28	790	17	401	60	470
Range Resources	35	51	26	946	19	397	32	1,595
Quicksilver Resources	43	32	31	638	15	420	47	888
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US Total ^{2,3}		18,761		186,900		32,233		
Top 10 Total		6,232		73,786		7,347		
Top 10 % of US Total		33.2%		39.5%		22.8%		
Top 20 Total		8,574		98,770		11,603		
Top 20 % of US Total		45.7%		52.8%		36.0%		

SOURCE: [Oil and Gas Journal](#). "OGJ 200," September 19, 2005.

NOTE: Rankings are pro forma for Chevron's acquisition of Unocal, ConocoPhillips acquisition of Burlington and Noble's merger with Patina.

¹ Total Assets are for oil and gas operations only.

² US total Production and US Total Reserves from [BP Statistical Review of World Energy](#), June 2005, Workbook tables.

³ Total US Wells Drilled from EIA [Annual Energy Review 2004](#).

Significant producers in the basins that supply California include Anadarko, BP, Chevron, ConocoPhillips, Devon Energy, El Paso, Encana, ExxonMobil, Occidental, Questar, Shell, and Williams.

Ownership of Natural Gas Processing Does not Appear to Be Concentrated

There are over 580 natural gas processing plants in the U.S.⁵ These plants are owned by well over 100 companies. The state agencies do not have detailed information regarding market concentration in the natural gas processing industry. However, we have found no data to indicate that gas processing is a highly concentrated business. We note that in 2004, only two-thirds of U.S. natural gas processing capacity was used, suggesting that processing is not the most constrained portion of the natural gas supply chain.⁶

Companies that own processing assets in the basins that supply California include BP, Chevron, ConocoPhillips, and Duke through their joint ownership of Duke Energy Field Services, Occidental, Questar, and Williams.

Interstate Pipelines Ownership is Concentrated, but Regulated by FERC

Three of the major pipelines that bring gas to California are wholly-owned by single owners, the El Paso, GTN, and Kern Pipelines. One major pipeline is owned by two different companies, Transwestern is a 50/50 joint venture between General Electric and Southern Union Company. The pipeline owners' revenues are regulated by the FERC.

In the Western region as a whole, one company, El Paso, owns pipelines that represent over 45 percent of total western interstate pipeline capacity and over 50 percent of the total length of major western pipelines. Eight companies account for almost all of the pipeline capacity on major interstate pipelines in the west.

⁵ Ibid.

⁶ "Gas Processing Survey." Oil & Gas Journal. June 27, 2005, p.33.

The following table indicates the market share by pipeline in 2004:

TABLE B. 5-2: Top Owners of Major Interstate Pipelines in the Western Region

Owner	Capacity (MMcf/ day)	% of Total Capacity	Length (miles)	% of Total Length	Pipelines
El Paso	10,690	46%	15,200	54%	Colorado Interstate, El Paso Natural Gas, Mojave, Wyoming Interstate
Williams	3,500	15	4,158	15	Northwest Pipeline
TransCanada	3,400	15	692	2	Gas Transmission - Northwest, North Baja
Questar	2,180	9	3,288	12	Questar Pipeline, Questar Southern Trails, Overthrust
MidAmerican	1,700	7	1,679	6	Kern River
Southern Union	618	3	1,200	4	Transwestern (50%)
General Electric	618	3	1,200	4	Transwestern (50%)
Kinder Morgan Energy Partners	425	2	300	1	TransColorado
Sierra Pacific	57	0	115	0	Tuscarora (50%)
TC Pipeline LP	57	0	115	0	Tuscarora (50%)
Total	23,243	100%	27,946	100%	

SOURCE: List of major pipelines from FERC; Capacity and length data from owners' websites.

Top 10 Owners of Interstate Pipeline Capacity Hold Over 60 Percent of Total

Table B.5-3 shows the top 10 pipeline capacity owners in California in 2004. The top three companies own natural gas utilities. The remaining companies are either natural gas producers or generators.

TABLE B. 5-3: Market Share by Pipeline Capacity Owner in 2004

Company	Market Share	Capacity (MMcf)
Sempra	20.7%	1,721
PG&E	11.6	964
Southwest Gas Corp.	5.9	491
Chevron	4.2	347
Reliant Energy	3.6	300
BP	3.5	289
Calpine Corp.	3.3	277
Sierra Pacific Resources	3.2	266
Duke Energy Corp.	3.0	251
Shell	2.1	174
Total	61.1%	5,080

SOURCE: FERC, 2004 State of the Markets Report, June 2005, staff report by the Office of Market Oversight and Investigations, p. 199.

Natural Gas Storage Is Highly Concentrated, but Independent Facilities Have Recently Reduced Concentration

There are 415 underground natural gas storage facilities in the U.S., including nine facilities in California.⁷ About 60 percent of California storage capacity is controlled by SoCalGas, an affiliate of Sempra Energy. Another 20 percent is owned by PG&E. Two independent storage facilities have been developed, which has reduced market concentration. All nine facilities are regulated by the CPUC; however, the two non-utility facilities can offer all of their storage capacity at market rates.

⁷ Ibid.

TABLE B. 5-4: Storage Capacity in Western States

	Capacity (Bcf)	Percentage of California Storage	Percentage of Western Storage
<u>California Storage</u>			
SoCalGas	125	60%	12%
PG&E	43	20	4
Wild Goose	25	12	2
Lodi	17	8	2
California Total	210	100%	19
Other Western Storage	867		81
Western States Total*	1,077		100%

*Includes Colorado, Montana, New Mexico, Oregon, Utah, Washington and Wyoming; data from EIA, Natural Gas Annual 2004, Table 14.

Top 10 Marketers Sell Volumes Equal to 90 Percent of North American Production

The table below shows the top North American Gas Marketers based on the most recently available quarterly data from the third quarter of 2005. Also shown is the volume sold as a percentage of North American daily production, using the most recently available data from 2004. Note that physical volumes may be marketed several times between the wellhead and the burnertip, so the total percentage marketed exceeds 100 percent. Nonetheless this data is provided as a reference point to show that the volumes marketed by the largest gas marketers are equal to a significant percentage of total North American production.

TABLE B. 5-5: Top 20 North American Gas Marketers, Third Quarter 2005

Rank	Company	Wholesale Physical Volumes Sold (Bcf/d) ⁸	Volume Sold as Percentage of North American Daily Production ⁹
1	BP	27.2	37.5%
2	ConocoPhillips	12.2	16.8
3	Shell (Coral)	9.8	13.5
	Sempra	9.8	13.5
5	Chevron	6.1	8.4
	Top 5 Subtotal	65.1	89.7%
6	Cinergy	5.4	7.4
7	Constellation	5.1	7.0
8	Nexen	5.0	6.9
9	UBS	4.6	6.3
10	Tenaska	4.4	6.1
	Top 10 Subtotal	89.6	123.4%
11	Louis Dreyfus	4.2	5.8
12	EnCana	3.2	4.4
13	Oneok	3.0	4.1
14	Calpine	2.7	3.7
15	ExxonMobil	2.5	3.4
16	Sequent	2.3	3.2
17	Williams	2.2	3.0
	Devon Energy	2.2	3.0
19	Merrill Lynch	2.1	2.9
20	Burlington Resources	1.8	2.5
	Top 20 Total	115.8	159.5%

We do not have access to data that shows the full size of the market for wholesale physical natural gas trading, so we are not in a position to make an educated judgment about the degree of concentration. However, we do note that in the third quarter of 2005, the top five gas marketers sold more gas than the next 15 largest marketers combined.

⁸ Gas Daily, December 12, 2005, p.7.

⁹ 2004 North American daily production of 72.6 Bcf/day from BP Statistical Review of World Energy, June 2005, Workbook tables.

C. Responses to Questions about the Identity of Market Participants

C.1. Who are the producers in the producing basins that serve California?

The state agencies do not have comprehensive data on the identities of producers in the out-of-state natural gas basins that serve California.

The CPUC was able to obtain 2004 information about the largest natural gas producers in the states of Wyoming, New Mexico, Texas, and California. This information provides a good indication of the largest natural gas producers in California, the Rockies, and the San Juan basins, and to a certain extent likely provides information about the largest producers in the Permian basin. (The Permian basin is just one of several basins in Texas.) The CPUC was also able to obtain 2002 information about the largest producers in Alberta, Canada, the source of almost all Canadian gas delivered to California. This information is shown in Appendix II.

The CPUC also has information on producers and marketers from whom California natural gas and electric utilities procure natural gas supplies, as well as information about the suppliers of natural gas to DWR under its gas tolling arrangements. Firms supplying gas to the natural gas utilities and DWR over the past several months are shown below (grouped by supplying basin):

Southwest Basins

ABQ Energy
Allied Energy Resource
Apache Corporation
Astra Power
BP Energy
Burlington Resources
Cargill Inc.
Chevron Natural Gas
Choice Energy
ConocoPhillips

Constellation Energy
Cook Inlet Energy Supply
Coral Energy Resources
Devon Energy Production
Duke Energy Trading Marketing
Dynergy Marketing and Trade
Enserco Energy
ETC Marketing
ExxonMobil
Frontier Field Services

GFI Energy
Louis Dreyfuss Energy Services
Merrill Lynch Commodity
National Fuel Marketing Company
NGTS LP
Occidental Energy Marketing
One Nation
ONEOK Energy Services
OTC Energy
PPM Energy
Reliant Energy Services
Richardson Energy Marketing
Saddleback Energy
Sempra Energy Trading

Rockies

Anadarko Energy Service
BP Energy
Cargill
Chevron
ConocoPhillips
Enserco Energy Inc.
Geary Energy
Louis Dreyfuss
Occidental Energy Marketing

Canada

Avista Energy
BP Canada Energy Marketing
Burlington Resources Canada
Canadian Imperial Bank of
Commerce
Canadian Natural Resources
Cargill
Chevron Natural Gas
Cinergy Canada
Cinergy Marketing and Trading
Cinergy Marketing
ConocoPhillips
Constellation Energy
Cook Inlet Energy Supply
Coral Energy Resources
Coral Energy Canada

Southern Ute Indian Tribe
Tenaska Marketing
Titan Gas
Total Gas and Power
Tristar Producer Services
TXU Portfolio Management
UBS AG
United Energy Trading
Visage Energy Corp
Walden Energy
Wasatch Energy
Western Gas Resources
Williams Power Company

Questar Energy Trading
Reliant Energy Services
Saddleback Energy
Sempra Energy Trading
Tenaska Marketing
Visage Energy Corp
Wasatch Energy
Williams Power

Devlar Energy Marketing
Enserco Energy
Esprit Exploration
Imperial Oil Resources
Louis Dreyfuss Energy Services
Natural Gas Exchange Inc
Occidental Energy Marketing
Pacific Summit Energy
PPM Energy
Primewest Energy
Sempra Energy Trading
Talisman Energy Canada
UBS AG
United Energy
Wasatch Energy
Western Gas Resources

The reason fewer names are listed for the Rockies region is that California natural gas utilities have only recently obtained firm interstate pipeline capacity to the Rockies, and in much smaller amounts relative to pipeline capacity to the southwest and Canada.

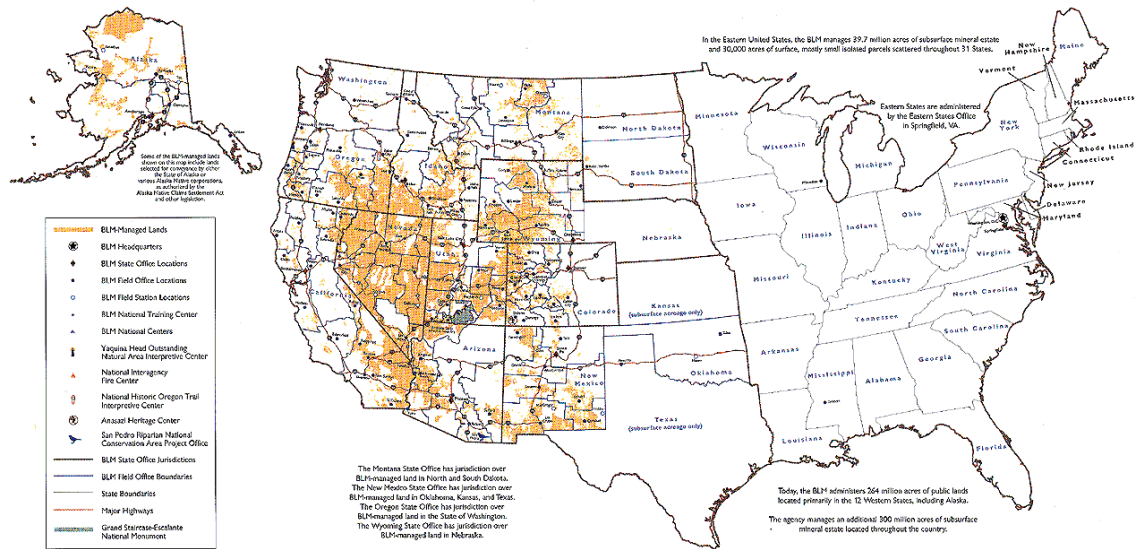
The CPUC also reviewed the names of DWR's natural gas suppliers during a recent period, and did not see any additional names beyond those provided above.

C.2. Who are the royalty owners in the producing basins that service California?

Many entities own natural gas that is delivered to the California market.

In the U.S., the federal government, state governments, Native American governments, and thousands of private landowners own mineral rights. In the Western United States, the largest mineral rights owner is the federal government. On the U.S. coasts, states own the mineral rights within three miles of the shoreline and the federal government owns mineral rights beyond three miles. Figure C2-1 shows the areas owned by the federal government. Federal ownership in California is not as much as in other western states. Instead a significant part of the resources are owned by numerous private organizations and private individual owners.

Figure C2-1: Public Lands managed by the Bureau of Land Management
(Source: Bureau of Land Management)



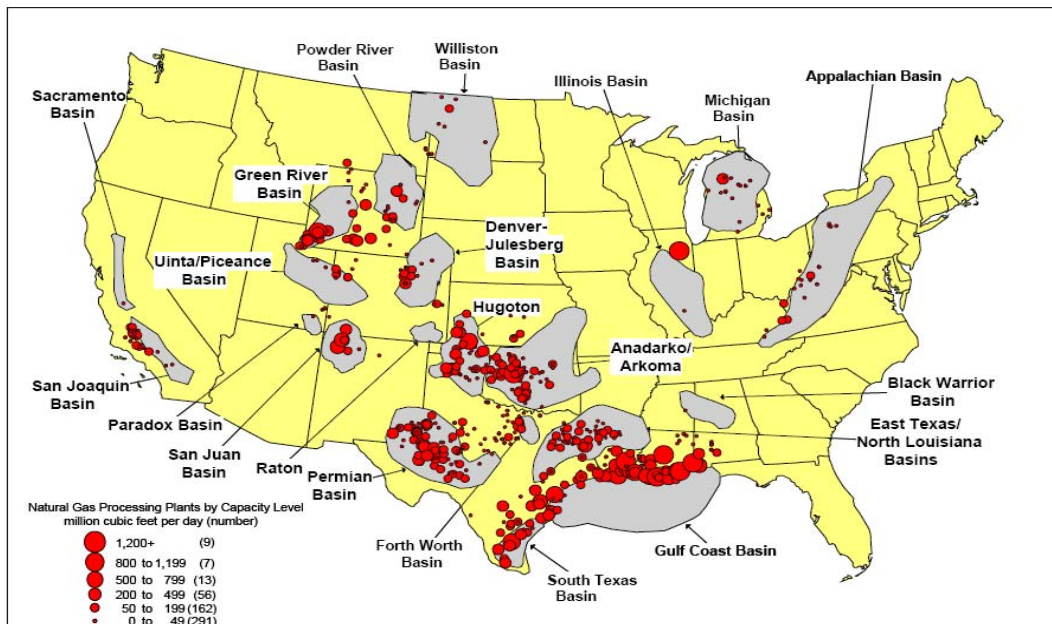
In Canada's Western Sedimentary Basin, there are two principal types of resource ownerships:

- Freehold, where the landowner owns the mineral rights because his/her family homesteaded and owned that land early in the 20th century
- Government, including the Crown (federal government), Provincial, or aboriginal ownership

C.3. Who performs the gas gathering and processing functions in each of the producing basins?

The ownership of gas gathering and processing facilities is quite diverse throughout the U.S. and Canada. Figure C3-1 shows the locations of the gas processing plants in the U.S. As expected, gas processing facilities are located in the same areas where gas is produced.

Figure C3-1: Location of Natural Gas Processing Plants in the U.S.



(Source: EIA)

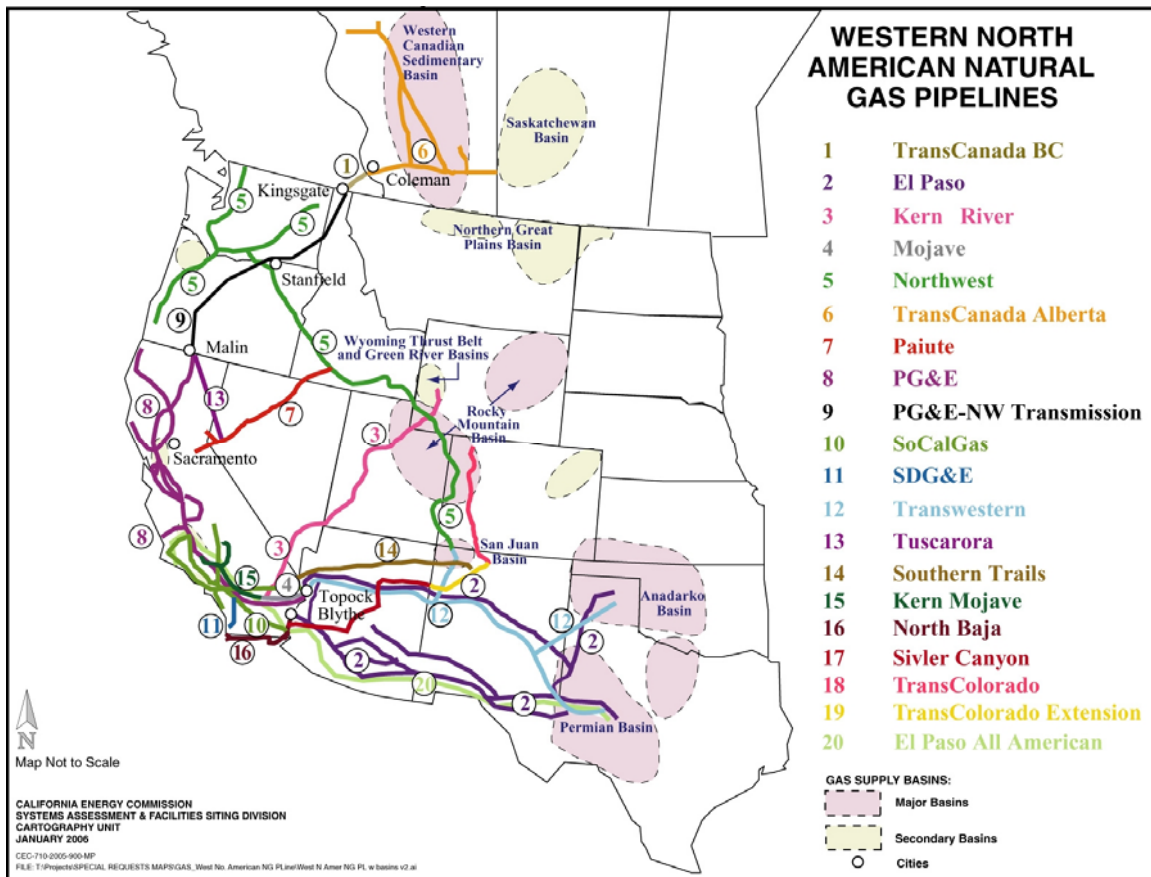
According to the Energy Information Agency, FERC mandated restructuring of the natural gas industry in the 1990s changed the economics of gas processing plant ownership. Prior to restructuring, most gas processing plants were owned by natural gas producers. After restructuring, most natural gas producers sold their processing plants to concentrate on exploration and production. The current predominant gas processing companies, also known as “mid-stream” companies, are:

- Duke Energy Field Services (54 plants, 7.5 billion cubic feet per day (BCF/D))
- Enterprise Products Operating LP (26 plants, 6.3 BCF/D)
- Targa Resources (21 plants, 3.4 BCF/D)
- BP PLC, 13 plants, 5.6 BCF/D)

C.4. Who are the pipelines that transport gas out of the producing basins to California? To other parts of America?

Eight interstate pipelines transport natural gas to California from producing basins. Figure C4-1 shows the location of these pipelines and the supply basins.

Figure C4-1: Natural Gas Infrastructure in the Western States



The pipelines are:

- **Gas Transmission Northwest** owned by TransCanada Pipeline Company (TCPL), supplies natural gas produced in Canada. The pipeline traverses Washington and Oregon before delivering gas into PG&E's pipelines at Malin, CA. The capacity on this pipeline is about 2,190 million cubic feet per day (MMcfd).

- **Kern River Pipeline** owned by Kern River Natural Gas Pipeline Company, brings natural gas from the Rocky Mountain basin. The pipeline traverses Idaho and Nevada and enters California and terminates in Daggett, CA where it connects with the PG&E and Sempra pipelines. A lateral connection also delivers gas directly to the High Desert Power Plant. The capacity of the Rocky Mountain Pipeline is about 1,830 MMcfd.
- **Mojave pipeline** owned by the Mojave pipeline Company, takes supply from the El Paso pipeline at the Arizona-California (AZ-CA) border and joins with the Kern River pipeline to terminate at Daggett, CA. Capacity of this pipeline is 400 MMcfd.
- **El Paso System** owned by the El Paso Natural Gas Company, brings gas from the San Juan and Permian basins. The pipeline system consists of three segments.
 - The El Paso North System brings gas from the San Juan basin and terminates in Topock, AZ connecting with PG&E, Sempra, and the Mojave pipelines. Capacity on the Northern system is 2,300 MMcfd.
 - The El Paso South System brings gas from the Permian basin. The majority of this gas serves the southwestern desert markets in the Arizona-New Mexico region. The pipeline with a capacity of 1,410 MMcfd brings the gas to Ehrenberg, AZ, and connects with Sempra and the Baja Norte pipeline and El Paso's Line 1903 at Ehrenberg, CA. The north and south systems are interconnected by the Havasu pipeline in Arizona, just east of the AZ-CA border.
 - Line 1903 is located inside California and interconnects several pipelines inside the state. Line 1903 has a capacity of 500 MMcfd and connects Daggett, CA to Ehrenberg, CA.
- **Transwestern pipeline** owned by the Transwestern Pipeline Company brings natural gas from the San Juan basin and connects with PG&E and Sempra pipelines at Needles, CA, just north of Topock, AZ. Capacity of the Transwestern pipeline is about 1,210 MMcfd.

- **Southern Trails** owned by Questar Company, brings gas from the Rocky Mountain basin and delivers at Topock, CA into Sempra Utilities pipelines. Capacity of the Southern Trails pipeline is 80 MMcfd.
- **Baja Norte** owned by the TCPL and Sempra Energy takes gas from the El Paso Southern system at Ehrenberg, CA and transports it through California and across the border into Baja California. The pipeline, with a capacity of 500 MMcfd, delivers gas to the power plants near Mexicali and transports the remaining gas to Rosarito power plants south of Tijuana, Baja California.
- **Transportadora de Gas Natural (TGN)** was used to transport gas from California to Mexico at the Otay Mesa border crossing point, with a capacity of 174 MMcfd. Since Baja Norte's operations began, the TGN pipeline has not been used. The pipeline, in the future, will be modified by reversing its flow direction, to bring in gas from the Baja Norte pipeline in Mexico to the U.S. Capacity of this pipeline is expected to be in the range of 200 to 300 MMcfd.

About 160 pipeline companies transport gas throughout the rest of the U.S. They operate over 285,000 miles of pipe, of which, 180,000 miles consist of interstate pipelines. These pipelines are capable of transporting over 119 billion cubic feet (Bcf) of gas per day from producing regions to consumers. The major U.S. pipelines across the U.S. include the Cheyenne, El Paso, Bossier, Kinder Morgan, Northern Natural, Northern Border, Iroquois, and Alliance Pipelines.

C.5. Who are the California wholesale buyers of gas transported by pipeline?

Wholesale buyers of natural gas include the California natural gas utilities and wholesale customers of the natural gas utilities.

- Pacific Gas and Electric Company
- Southern California Gas Company
- San Diego Gas & Electric Company
- Southwest Gas Company
- West Coast Gas Company
- Alpine Natural Gas

- Southern California Edison (for Santa Catalina Island)
- City of Palo Alto
- City of Coalinga
- City of Long Beach
- City of Vernon
- Island Energy

Pacific Gas and Electric Company has firm interstate pipeline capacity rights on GTN Northwest, TransCanada Pipeline Limited, and on the NOVA Gas Transmission System. These pipelines supply PG&E with natural gas from Alberta, Canada. PG&E also has firm capacity rights on El Paso Pipeline and Transwestern Pipeline, which provide supplies from southwest basins.

Southern California Gas Company has firm interstate pipeline capacity rights on El Paso Pipeline, Transwestern Pipeline, and Kern River Pipeline. Kern River supplies natural gas from the Rockies.

SDG&E (which is a wholesale customer of SoCalGas) has firm interstate pipeline capacity on GTN Northwest, TransCanada Pipeline Limited, the NOVA Gas Transmission System, El Paso Pipeline, Transwestern Pipeline, and Kern River Pipeline.

Southwest Gas has firm interstate pipeline capacity on El Paso Pipeline, Kern River, Tuscarora Pipeline, Paiute Pipeline, and Northwest Pipeline. Tuscarora, Paiute, and NWPL ship primarily Canadian gas to Southwest.

C.6. Who are the California retail buyers of gas transported by pipeline (noncore utility customers)?

Few retail gas customers of utilities directly hold firm interstate pipeline capacity rights, and neither the CPUC nor the California Energy Commission have data about retail noncore customers' purchasing practices. Almost all firm interstate

pipeline capacity rights to delivery points in California are held by utilities, a small number of cities which procure gas for electric generation, or natural gas marketers.

The CPUC reviewed the index of customers of El Paso, Transwestern, Kern River, and GTN Northwest, the four major interstate pipelines that serve California. Aside from natural gas utilities and marketers, the CPUC could identify only the following parties as retail gas customers who hold firm capacity rights on these pipelines:

- Department of Water and Power of Los Angeles, on Kern River and El Paso
- Sacramento Municipal Utility District, on Kern River, GTN Northwest and Transwestern
- City of Burbank, on GTN Northwest
- City of Glendale, on GTN Northwest
- City of Pasadena, on GTN Northwest
- City of Redding, on GTN Northwest and Kern River (Agent – Constellation)
- Turlock Irrigation District, on GTN Northwest
- Northern California Power Agency, on GTN Northwest
- Crockett Cogeneration, on GTN Northwest
- Sierra Pacific Power, on GTN Northwest
- US Gypsum Company, on GTN Northwest, El Paso and Transwestern
- Nucor Steel Kingman, on TW
- Frito Lay, on TW
- DWR (Agent – SDG&E), on Kern River
- American Pacific Corp (Agent – Industrial Gas Resource Corp) on Kern River
- Berry Petroleum (Agent – BP Energy) on Kern River

In a number of cases, some marketers who hold firm interstate pipeline capacity rights may be purchasing natural gas for their corporate affiliate's power plants in California. For example, Calpine Energy Services may be purchasing natural gas supplies for Calpine power plants, but it may also be marketing gas supplies to other California consumers.

As explained elsewhere in this report, most noncore customers procure natural gas through a marketer, which in turn may enter into a variety of arrangements

(e.g., supply contracts, interstate pipeline capacity rights, storage rights, etc.) to deliver natural gas to clients.

C.7. Who are the gas marketers and brokers?

The CPUC understands this question to request the names of marketers and brokers that hold firm interstate pipeline capacity rights to California.

In response to question C.1 above, the CPUC provided the names of marketers and producers that sold natural gas to California's major gas utilities over a recent period. The state agencies also provide the names of the top North American marketers elsewhere in this report.

The CPUC reviewed the "index of customers" for each of the four major interstate pipelines that serve California. While the CPUC is unable to definitively determine which firms are "marketers" or "brokers," the following entities appear to be marketers holding interstate pipeline capacity rights on those pipelines:

Marketers on El Paso Pipeline

Aera Energy
Allegheny Energy Supply
Aquila Long Term
ASARCO Inc
Astra Power
BP Energy
Burlington Resources Trading
ConocoPhillips
Coral Energy Resources
Duke Energy Trading and Marketing
Dynegy Marketing and Trade
El Paso Marketing
MGI Supply
Natural Gas Processing

Occidental Energy Marketing
OGE Energy Resources
ONEOK Energy Services
Phelps Dodge Corporation
PNM Gas Services
Reliant Energy Services
Semptra Energy Trading
Sterling Natural Gas?
Tenaska Marketing Ventures
Texaco Natural Gas
TXU Portfolio Management
United Energy Trading
UNS Gas Inc
Williams Power Company

Marketers on Transwestern Pipeline

UNS Gas
Williams Power
ConocoPhillips
Burlington Resources Trading
BP Energy
Chevron USA
Duke Energy Trading
El Paso Marketing
Sempra Energy Trading
PNM Gas Services
Calpine Energy Services
Western Gas Resources
Agave Energy
ABQ Energy Group
Cross Timbers Energy Services
EnCana Marketing USA

National Fuel Marketing Company
Wasatch Energy
Red Willow Production
Duke Energy Field Services
WTG Gas Marketing
Enserco Energy Inc.
NGTS LP
Tenaska Marketing
Astra Power
New Mexico Natural Gas
Samson Resources
Eastern New Mexico Gas Assn
Richardson Energy Marketing
Pogo Producing
Magnus Energy Marketing
OneOK Bushton Processing

Marketers on Kern River Pipeline

Aera Energy (Agent- Coral Energy Resources)
Allegheny Energy Supply
BP Energy
Calpine Energy Services
Chevron USA
Coral Energy Resources
Edison Mission Energy
El Paso Marketing
High Desert Power Trust
Occidental Energy Marketing
Pinnacle West Capital Corp
Questar Energy Trading
Questar Gas
Reliant Energy Services
Sempra Energy Trading
Williams Power Company

Marketers on GTN Northwest to Malin

BP Canada Energy Marketing
Burlington Resources Canada
Marketing
Calpine Energy Services
CanNat Energy Inc.
Cargill Inc.
Cascade Natural Gas Corporation
Chevron USA Inc.
ConocoPhillips
Coral Energy Resources
Devon Canada Corp.
Duke Energy Marketing America
EnCana Marketing (USA)
Husky Gas Marketing Inc

IGI Resources, Inc.
Louis Dreyfuss Energy Canada
Nexen Marketing USA
Occidental Energy Marketing
Paramount Resources
Penn West Petroleum
PetroCanada Hydrocarbons
Petrobank Energy and Resources
PPM Energy Inc
Semptra Energy Trading
Suncor Energy Marketing
Talisman Energy
Wasatch Energy

C.8. How are the physical elements of gas infrastructure (production, processing, transmission) financed?

Funds to finance exploration, development, and production can be obtained from a firm's operation or through debt and equity financing, including internally generated funds, debt financing and equity financing. Exploration has the highest risk while production has the lowest. Depending on the risks associated with different phases of activity, a number of financing options are available. A firm's ability to sustain its operation to ensure repayment of the amount financed will determine the available options of financing.

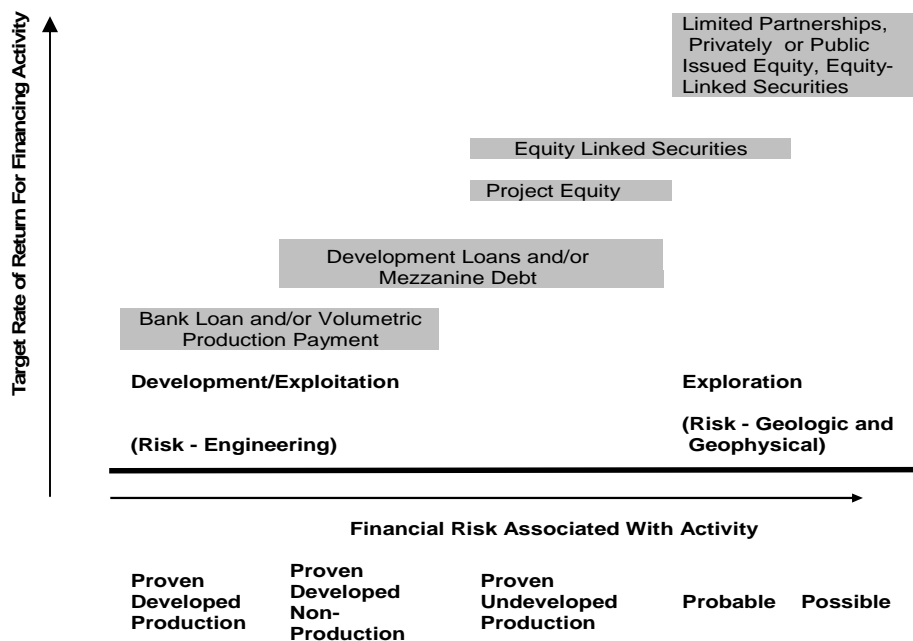
C.9. Who are the financing entities?

Large integrated oil and natural gas producers and large independent natural gas producers, with excellent credit ratings are able to finance much of their activity through the firm's cash flow and by obtaining debt through commercial banks, syndicated loans, and the bond market (public and private placement). Smaller firms, without a strong asset base or cash flow, use other options such as equity linked security, limited partnerships or the selling of a working interest in its operation to finance their expenditures.

Firms with sufficient known reserves can obtain financing through normal banking channels. A producer can reduce the price risk in the natural gas market by selling the gas forward, executing “swap agreements,” and/or through the use of financial derivative instruments. A derivative derives its value from the value of another financial instrument or variable. Companies use derivative instruments such as futures, swaps and options, and physical delivery contracts with the purpose of protecting profit from exposure to a decline in the market price and to minimize the variability in cash flow from a portion of its gas production.

Futures contracts are used to fix the price of expected future natural gas sales at major trading locations such as the Henry Hub, Louisiana. Swap agreements also fix the price differential between the price at Henry Hub and various other market locations. Options are used to establish a floor and/or ceiling price for future gas production. The risk associated with financing debt with future gas production is determining what the future price of gas will be when the gas is produced. Figure C9-1 shows a schematic layout of relationship of risks involved and expected returns in various phases of the oil and gas industry.

Figure C9-1: Oil and Gas Industry Financial Risk and Expected Rate of Return



Appendix I.D. discusses the details of financing methods and implications to large and small firms in the oil and natural gas markets. Appendix I.D. also discusses the steps involved with natural gas projects in California.